Implementing the European strategy on High Performance Computing

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Digital Single Market Strategy for Europe

Overarching policy framework adopted by the Juncker's Commision on May 5th, 2015
DSM in a nutshell

• Better online access to digital goods and services
  • Helping to make the EU's digital world a seamless marketplace to buy and sell

• An environment where digital networks and services can prosper
  • Designing rules which match the pace of technology and support infrastructure development

• Digital as a driver for growth
  • Ensuring that Europe's economy, industry and employment take full advantage of digitalisation
**Context:** The EU manufacturing sector accounts for 2 million companies and 33 million jobs; 15% of our GDP, 80% of our exports and 2/3 of R&D investment.

*Increased use of digital technologies brings innovation into more productive and more efficient production processes, and in new business models.*

**Objective:** maximise the benefits from the uptake of digital technologies across European industry, while ensuring that our industrial fabric and our workforce adapt to the digital era.

*The necessary infrastructure for innovation will combine Cloud, HPC and Big Data resources and capabilities (e.g. Science Cloud).*
The European HPC strategy is an essential building block to meet the ambitions of the DSM for Europe to **digitise industry**

- HPC transforms big scientific, industrial and societal challenges into innovation and business opportunities

- HPC and Big Data drive major advances and innovation in the **global digital economy**, giving a **competitive edge** and faster access of innovation results to markets

- World-class computing capability in Europe as part of the European Research and Science Cloud will consolidate Europe's place as a world-leading innovation hub
HPC Strategy in Horizon 2020

Access to best HPC for industry and academia

*Excellent Science e-infrastructures*

- Collaboration of HPC Supercomputing Centres and application CoEs
- Provision of HPC capabilities and expertise

**Excellence in HPC applications (Centres of Excellence)**

*Excellent Science e-infrastructures*

**EU development of Exascale technologies**

*FET/HPC*

- Specifications of exascale prototypes
- Technological options for future systems

- Identify applications for co-design of exascale systems
- Innovative methods and algorithms for extreme parallelism of traditional/emerging applications

PPP with ETP4HPC (700 m€ in Horizon2020)
HPC in the overall Horizon 2020 context

**Applications**
- Societal challenges
- Scientific strategic applications
- Emerging domains (Big Data)
- New methods and algorithms

**Exascale technologies**
- Architectures, programming, environments, tools...
- Exascale Prototypes

**Pan-European HPC Infrastructure**
- HPC Capability
- HPC Services
- Support to innovation

**Training**
- Education
- Skills

**SMEs**
- Services, Competence Centres

**CLOUDS**
- BIG DATA - ADVANCED COMPUTING

- Research and Science Cloud

**Centres of Excellence**
- (40 m€)

**SMEs**
- Network of SME competence centres
- (2 m€)

**WP2014-15 ~155 M€**
(~144 in the cPPP)

**WP2016-17 ~151 M€ (*)**
(85 in the cPPP)

**PRACE-4IP**
(15 m€)

**PRACE**
(15 m€)

**PPI for HPC**
(26 m€)

**HBP - HPC**
(25 m€)

**PRACE-4IP**
(15 m€)

**Core technologies**
(93.4 m€)

**Ecosystem development**
(4 m€)

**Co-design**
(41 m€)

**Transition to exascale SW**
(40 m€)

**Ecosystem development**
(4 m€)

(*) pending formal approval
Next steps in Horizon 2020

Establishment of first Centres of Excellence (end 2015)

Study to follow the progress on the implementation of the European HPC strategy (mid-2015)

- HPC market and HPC R&I landscape in the EU
- Impact and the return on HPC investments in innovation and economic progress and growth in the EU.
- Status of the implementation of the HPC Communication Action Plan

Warning: pending formal approval

- Focus on service orientation and innovation
- Support to implementation of the Pan-European HPC infrastructure (PRACE)
- Support to procurement of innovative solutions in HPC (PPI)
- Core technologies towards exascale (PPP in HPC)
- HPC platform of the Human Brain Project (HBP)
- User-driven innovation (open call mechanism)
  - Link to FORTISSIMO, SHAPE?
Next steps in the HPC strategy

Continue technological development of key building blocks and HPC applications

- FET programme towards exascale
- e-infrastructure HPC Centres of Excellence for application co-design, development, optimization and provisioning

Integration of technological building blocks into extreme-scale platforms/demonstrators

- proof-points of technological readiness, usability and scalability
- co-design process meeting the needs of strategic European applications, linking the industrial environment supply and use
- exascale performance expected by 2021-2022 in view of exascale by 2023

Coordinated acquisition strategy complementing integration

- procurement/acquisition of pre- and exascale systems for transitioning the European set of leading machines to the new computing generation (collaboration with PRACE)
HPC Timeline in H2020 for the PPP

Projects from 2014 Call:
Building technology blocks & 1st round CoEs

Projects from 2016 Call:
1st level co-design

Projects from 2017 Call:
Exascale transition

Future 2018/19/20 Calls:
Extreme Scale Demonstrators (2nd-level co-design / integration) & 2nd round of CoEs (draft)

HPC Ecosystem development
In response to Jean-Christophe

Preparation of the Council ("Competitiveness") of 28-29 May 2015
Draft Council conclusions on open, data-intensive and networked research as a driver for faster and wider innovation

12. STRESSES the importance of PRACE\textsuperscript{12}, a world-class European High Performance Computing (HPC) infrastructure for research that provides access to computing resources and services for large-scale scientific and engineering applications; ACKNOWLEDGES the need to develop the new generation of HPC technologies and CALLS for the reinforcement of the interconnected network of data processing facilities GEANT\textsuperscript{13}. In this respect, INVITES ESFRI to explore mechanisms for better coordination of Member States' investment strategies in e-infrastructures, covering also HPC, distributed computing, scientific data and networks;
Thanks!